Preliminary Step: *Define the components of the SVS system and environment*

1. **The Human:**
   We will be looking only at the pilot flying (PF) with regards to the SVS system. However, pilots of other aircraft, as well as other crew members will occasionally be considered to the extent which they affect the PF.

2. **The Environment:**
   Although the SVS is capable of supporting all phases of flight, we will be focusing only on approach and landing situations using the SVS.

3. **The Machine:**
   We are working with the following SVS system:

Description of the SVS Used For the Current Analysis:

Virtual Visual Environment:

- Mimics what could be seen out the window in good visibility conditions
- **Uses either a photo-realistic terrain display, a less detailed terrain texture display, or a wire-frame rendering of terrain
- Display is head-down
- **May have three possible display sizes (757 EADI 5 x 5.25 inch, 777 PFD 6.4 x 6.4 inch, and rectangular flat-panel 8 x 10 inch)
- May have four possible field of views, which are pilot selectable
- PFD symbology is overlaid on the SVS display (this is not selectable)
- Obstacles in proximity of own aircraft are displayed via the terrain database
- Runway edges are depicted
- Salient features are highlighted on the display
- Pilot has the ability to declutter the display
- The SVS will give an auditory or visual warning if impact with terrain is immanent
- The pilot manually enters flight path data into the SVS (or through the FMS)

Primary Flight Display Information:

- Primary flight display information is overlaid on the SVS display
- Primary flight display information is not redundantly coded elsewhere in the cockpit

- Primary flight display information includes: altitude, airspeed, ground speed, attitude, vertical speed, velocity vector, and location with respect to navigation fixes

** = These are characteristics of the SVS that we are leaving undefined and have the potential to cause three way interactions between characteristics. Each of these SVS characteristics has a corresponding characteristic in the matrix.

Step #1: Chose the level of autonomy and intelligence of the system in order to create an information flow model

Autonomy: *In order to chose the level of automation, 6 questions were asked of the SVS system. It was determined that the level of automation in* ***INFORMATION FUSER.***

1. Does the machine perform any control actions?

NO. The SVS does not perform any control actions, it simply displays terrain information via the terrain database.

2. Can the machine manage the operator's displays autonomously?

NO. In order to answer yes to this question, the SVS would have to be capable of determining what information should be presented, what format it should be presented in, and how it should be presented. It is my understanding that the SVS is not this advanced. It does not determine anything, but simply presents information from a database depending on the position of the aircraft, which is determined by GPS technology.

3. Can the machine initiate interactions with the operator?

NO. In order to answer yes to this question, the SVS would have to make recommendations to the operator without being explicitly asked for them. It is my understanding that the SVS does not make any recommendations.

4. Can the machine provide recommendations or advice?

NO. Since we are no longer looking at an SVS system that incorporates a sensor, the hazard alerting system would not be present. Therefore, the SVS does not explicitly provide any recommendations to the pilot flying.

5. Does the machine perform any decision making functions?

NO. The SVS system does not make any decisions, it simply displays information from the database. In order to answer yes to this question, the SVS would need to perform some type of decision making such as categorization of targets.

6. Can the machine integrate information and construct displays?

YES. This would refer to a machine that can collect information and put it in the best format for presentation to the operator. Since the SVS is a simple display, which formats information from a database for presentation to the operator via the display, I think that it fits into this category. Therefore, the SVS is an **INFORMATION FUSER**

Intelligence: *In order to determine the level of intelligence, 4 questions were asked of the SVS system. The level of intelligence was determined to be **PERSONALIZED**.*

1. Can the machine predict the operator's behavior?

NO. In order to answer yes to this question the SVS would need to be able to collect and use information about the operator's physical state. This is not the case with the SVS.

2. Can the machine monitor the operator's physical state?

NO. The SVS cannot collect or use any information about the physical state of the pilot.

3. Can the machine infer operator intent?

NO. In order to answer yes to this question the SVS would need to be able to dynamically infer the operator's intent and assist the operator in carrying out this intent.

4. Does the machine use imbedded models of the operator?

YES. This refers to a machine, which can be personalized to present information in the particular way that the operator wants it. Since the operator can select FOV the SVS can be personalized in some way. Therefore, the level of intelligence is **PERSONALIZED.**